DETAILED ACTION

Introduction

1. This action is response to the amendment filed on 03-28-2011. Claims 1 and 15 have been amended. Claims 1-28 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arnold et al. (US PAT. 6,154,549) in view of Gerzon et al. (US PAT. 5,757,927) and Ito (US 20020172370)

Consider claim 1 Arnold teaches a method for controlling an acoustic field reproduction unit comprising a plurality of reproduction elements (see fig.1) comprising:

determining via a computer parameters describing the reproduction direction of each channel of a multi-channel audio signal (see fig.1 (10), (reads on the sound source, the sound source may be a stereophonic or an quadraphonic, a stereophonic or an quadraphonic includes two or more channels) and see col. 1 line 58-col. 2 line 54),

determining via a computer at least spatial characteristics of the reproduction unit, the spatial characteristics comprising at least the direction of each reproduction element

in the three spatial dimensions relative to a given point (see figs 1-6 (20) and see col. 9 line 30-col. 10 line 67), wherein the determined directions of the reproduction elements are different from the reproduction directions of the multi-channel audio signal(see figs. 1, 11(16), determining via a computer a spatial adaptation using the determined directions of the reproduction elements and the parameters describing the reproduction directions (see figs 1-6 and col.11 line1-col. 12 line 36), Arnold does not explicitly teach determining via a computer parameters from a multi- channel audio signal describing the reproduction direction of each channel of the multi-channel audio signal, and a spatial adaptation matrix using the determined directions of the reproduction elements and the parameters describing the reproduction directions, wherein the spatial adaptation matrix is determined such that controlling the reproduction elements with the controlling signals reproduces, in a region comprising the given point, the acoustic field that would have been obtained by controlling, with the multi-channel audio signal, ideal reproduction elements which would exactly comply with the reproduction directions of the multi-channel audio signal.

However, Ito teaches determining via a computer parameters from a multi- channel audio signal describing the reproduction direction of each channel of the multi-channel audio signal(see figs.1-3 and page 2, [0035]-page 3, [0043]), determining via a computer at least spatial characteristics of the reproduction unit, the spatial characteristics comprising at least the direction of each reproduction element in the three spatial dimensions relative to a given point(see figs. 9-12 and see page 4[0065]-page 5 [0079), wherein the determined directions of the reproduction elements are

different from the reproduction directions of the multi-channel audio signal(see figs 12-14 and page,[0083]-page 6, [0091]).

Therefore, it would have been obvious to one of the ordinary skill in the at the time the invention was made to combine the teaching of Ito into Arnold to provide a surround sound field reproduction system and a surround sound field reproduction, and a listener changes its posture so that a portion of a video image to which attention should be paid may be observed in front of the listener, a sound image can be localized accordingly in a direction in which the video image is observed in front of the listener.

On there other hand, Gerzon teaches a spatial adaptation matrix using the determined directions of the reproduction elements and the parameters describing the reproduction directions(see figs. 2-9), wherein the spatial adaptation matrix is determined such that controlling the reproduction elements with the controlling signals reproduces, in a region comprising the given point, the acoustic field that would have been obtained by controlling, with the multi-channel audio signal(see fig.14 (L, R)), ideal reproduction elements which would exactly comply with the reproduction directions of the multi-channel audio signal(CL, CR, LF, RF, LB, RB)(see figs 1-14 and see col. 25 line 25-col. 26 line 67).

Therefore, it would have been obvious to one of the ordinary skill in the at the time the invention was made to combine the teaching of Gerzon into Arnold to provide more efficiency to control reproduction sound field by using a matrix determined directions.

Consider claims 2-4, Arnold as modified by Gerzon and Ito teaches determining at least spatial characteristics of the reproduction unit (see fig.1) comprises an acquisition

sub-step enabling all or some of the characteristics of the reproduction unit to be determined(see abstract); and characterized in that the step for determining at least spatial characteristics of the reproduction unit (see fig.1) comprises a calibration step enabling all or some of the characteristics of the reproduction unit (see fig.1) to be provided (see figs 1-6 and see col. 9 line 30-col. 10 line 67); and the calibration sub-step (30) comprises, in the case of at least one of the reproduction elements (16) :

a sub-step for transmitting a specific signal (122) to the at least one element (16) of the reproduction unit (see fig.1); a sub-step for acquiring the sound wave emitted in response by the at least one element (16); a sub-step (131) for converting the acquired signals into a finite number of coefficients representative of the emitted sound wave; and a sub-step (32) for determining spatial and/or sound parameters of the element (3n) on the basis of the coefficients representative of the emitted sound wave(16) (see figs 1-6 and see col. 11 line 1-col. 12 line 36).

Consider claims 5-7, Arnold as modified by Gerzon and Ito teaches method where in the calibration sub-step also comprises a sub-step for determining the position in at least ode of the three spatial dimensions of the at least one element of the reproduction unit (see fig. 1 and see col. 9 line 30-col. 10 line 67); and characterized in that the calibration step comprises a sub-step for determining the frequency response of the at least one element of the reproduction unit(see fig. 1 and see col. 9 line 30-col. 10 line 67); and to characterized in that step for determining adaptation filters(see fig 5(102,122)) comprises: a sub-step for determining a decoding matrix representative of filters permitting compensation for the changes in reproduction caused by the spatial

characteristics of the reproduction unit (104); a sub-step for determining an ideal multi-channel radiation matrix representative of the predetermined general directions associated with each data signal of the plurality of input signals (U(n)); and a sub-step for determining a matrix representative of the adaptation filters using the decoding matrix and the multi-channel radiation matrix (In Gerzon, see fig. 10 (22, 23) and col.16 line 5-col. 17 line 67).

Consider claims 8-10, Arnold as modified by Gerzon and Ito teaches method wherein step for determining adaptation filters(see fig.10 (22, 23)) comprises a plurality of calculation sub-steps permitting the provision of a limit order of the spatial precision of the adaptation filters, a matrix corresponding to a spatial window representative of the distribution in space of the desired precision during the reconstruction of the sound field, and a matrix representative of the radiation of the reproduction unit, the sub-step for calculating the decoding matrix being carried out using the results of these calculation sub steps (In Gerzon, see figs 2-10 and col. 16 line 5-col. 17 line 67); and characterized in that the matrices for decoding , ideal multi-channel radiation and adaptation are independent of the frequency, step for determining at least one signal for controlling the elements of the reproduction unit by applying the adaptation filters corresponding to simple linear combinations followed by a delay (In Gerzon, see figs. 4-10 and col. 7 line 39-55 and col. 16 line 5 –col. 17 line 67); and method wherein the step for determining characteristics of the reproduction unit (see fig.5 (104)) permits the determination of sound characteristics of the reproduction unit (104)) and in that the method comprises a step (60) for determining filters for compensating for these sound

characteristics, the step for determining at least one control signal then comprising a sub-step for applying the sound compensation filters (In Gerzon, see fig. 10 (22,23) and col.16 line 5-col. 17 line 67).

Consider claims 11-14, Arnold as modified by Gerzon and Ito teaches method wherein that the step for determining sound characteristics is suitable for providing parameters representative, in the case of at least one element, of its frequency response (see fig. 1 and see col. 9 line 30-col. 10 line 67); and method wherein that the step for determining at least one control signal comprises a sub-step for adjusting the gain and applying delays in order to align temporally the wave front of the reproduction elements (see fig. 1 (16)) as a function of their distance from the given point (see figs. 1-6 and see col. 31 line 28- 67); and the computer program comprising program code instructions for performing the steps of the method according to claim 1 when the program is performed by a computer (see fig. 1 and see col. 9 line 30-col. 10 line 67); and the removable medium of the type comprising at least one processor and a non-volatile memory element, wherein the memory comprises a program comprising code instructions for performing the steps of the method according to claim 1, when the processor performs the program (see fig. 1 and see col. 9 line 30-col. 10 line 67).

Consider claim 15 Arnold teaches a device for controlling an acoustic field reproduction unit (see fig.1) comprising a plurality of reproduction elements(16) comprising – means(30) for determining parameters describing the reproduction direction of each channel of a multi-channel audio signal (see fig.1 (10), (reads on the sound source, the sound source may be a stereophonic or an quadraphonic, a

stereophonic or an quadraphonic is including tow or more channels) and see col. 1 line 58-col. 2 line 54), means (32) for determining at least spatial characteristics of the reproduction unit (see fig.1), the spatial characteristics comprising at least the direction of each reproduction element in the three spatial dimensions relative to the given, wherein the determined directions of the reproduction elements are different from the reproduction directions of the multi-channel audio signal(see figs. 1, 11(16) and see col. 9 line 30-col. 10 line 67), means (30) for determining spatial adaptation table using the determined directions of the reproduction elements and the parameters describing the reproduction(see figs. 1-6 and see col. 11 line 1-col. 12 line 36); Arnold does not explicitly teach means for determining parameters from a multi-channel audio signal describing the reproduction direction of each channel of the multi-channel audio signal, and means for determining spatial adaptation matrix using the determined directions of the reproduction elements and the parameters describing the reproduction, - means for determining a controlling signal for each reproduction element, by applying the adaptation matrix to the multi-channel audio signal, wherein the spatial adaptation matrix is determined such that controlling the reproduction elements with the controlling signals reproduces, in a region comprising the given point, the acoustic field that would have been obtained by controlling, with the multi-channel audio signal, ideal reproduction elements which would exactly comply with the reproduction directions of the multi-channel audio signal.

However, Ito teaches means for determining parameters from a multi-channel audio signal describing the reproduction direction of each channel of the multi-channel

audio signal(see figs.1-3 and page 2, [0035]-page 3, [0043]), means for determining at least spatial characteristics of the reproduction unit , the spatial characteristics comprising at least the direction of each reproduction element in the three spatial dimensions relative to the given point (see figs. 9-12 and see page 4[0065]-page 5 [0079), wherein the determined directions of the reproduction elements are different from the reproduction directions of the multi-channel audio signal(see figs 12-14 and page,[0083]-page 6, [0091]).

Therefore, it would have been obvious to one of the ordinary skill in the at the time the invention was made to combine the teaching of Ito into Arnold to provide a surround sound field reproduction system and a surround sound field reproduction, and a listener changes its posture so that a portion of a video image to which attention should be paid may be observed in front of the listener, a sound image can be localized accordingly in a direction in which the video image is observed in front of the listener.

On there other hand, Gerzon teaches means(see figs.10,14 (22,23)) for determining spatial adaptation matrix using the determined directions of the reproduction elements and the parameters describing the reproduction((W,X,Y) in fig. 10 and (L,R) in fig. 14), -means(122) for determining a controlling signal for each reproduction element, by applying the adaptation matrix to the multi-channel audio signal, wherein the spatial adaptation matrix is determined such that controlling the reproduction elements with the controlling signals reproduces, in a region comprising the given point(listener) (see col.16 line 5-col. 17 line 67), the acoustic field that would have been obtained by controlling, with the multi-channel audio signal, ideal reproduction elements which would

exactly comply with the reproduction directions of the multi-channel audio signal(CL, CR, LF, RF, LB, RB)(see figs 1-14 and see col. 25 line 25-col. 26 line 67).

Therefore, it would have been obvious to one of the ordinary skill in the at the time the invention was made to combine the teaching of Gerzon into Arnold to provide more efficiency to control reproduction sound field by using a matrix determined directions.

Consider claims 16-18, Arnold as modified by Gerzon and Ito teaches a device wherein that the means(see fig.1) for determining the at least spatial characteristics of the reproduction unit (see fig. 1) comprise means (38) for the direct acquisition of the characteristics(see figs. 1-6 and see col. 9 line 30-col. 10 line 67); and a device wherein it is suitable for being associated with calibration means (see fig.5)) permitting the determination of the at least spatial characteristics of the reproduction unit (see fig. 1 and see col. 9 line 30-col. 10 line 67); and a device characterized in that the calibration means comprise means (see fig.5) for acquiring a sound wave which comprise four pressure sensors(106) arranged in accordance with a general tetrahedral shape(see figs. 1-6 and see col. 9 line 30-col. 10 line 67).

Consider claims 19-22, 25 and 28 Arnold as modified by Gerzon and Ito teaches a device wherein the means(see fig.1) for determining characteristics are suitable for determining sound characteristics of at least one of the elements of the reproduction unit , the device comprising means(see fig.1) for determining sound compensation filters using the sound characteristics, and the means(30) for determining at least one control signal being suitable for the application of the sound compensation filters(see col. 3 line 5-67); and a device characterized wherein the means(see fig.1) for determining the

sound characteristics are suitable for determining the frequency response of the elements of the reproduction unit(see fig. 1 and see col. 9 line 30-col. 10 line 67); and an apparatus for processing audio and video data, comprising means (see fig.1) for determining a plurality of sound data input signals (10) each associated with a predetermined general reproduction direction defined by a given point (c), characterized in that it also comprises a device for controlling reproduction unit (see fig. 1 and see col. 9 line 30-col. 10 line 67); and an apparatus wherein the means(see fig.1) for determining a plurality of input signals(10) are formed by a unit for reading and decoding digital audio and/or video discs(see figs. 1-6 and see col. 9 line 30-col. 10 line 67) and the device wherein, when being applied, the spatial adaptation matrix remains as it has been determined(In Gerzon, see fig. 10 (22,23) and col.16 line 5-col. 17 line 67).

Consider claims 23 and 24, Arnold as modified by Gerzon and Ito teaches the spatial characteristics of the reproduction unit are determined without using the multi-channel audio signal (see fig. 1 and col. 11 line 1-67) and the spatial adaptation matrix is determined without using the multi- channel audio signal (In Gerzon, see fig. 10 (22, 23) and col.16 line 5-col. 17 line 67).

Consider claims 26 and 27, they are essentially similar to claims 23 and 24 and are rejected for the reason stated above apropos to claims 23 and 24.

Response to Arguments

5. Applicant's arguments with respect to claims 1-28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Cooper et al. **(US PAT. 5,333,200)** is cited to show other related method and device for controlling unit using a multi-channel signal.

8. Any response to this action should be mailed to:

Mail Stop ____(explanation, e.g., Amendment or After-final, etc.)

Commissioner for Patents
P.O. Box 1450
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Facsimile responses should be faxed to:
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lao, Lun-See whose telephone number is (571) 272-7501 The examiner can normally be reached on Monday-Friday from 8:00 to 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davetta W. Goins, can be reached on (571) 272-2957.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 whose telephone number is (571) 272-2600.

Lao, Lun-See
/LUN-SEE LAO/
Examiner, Art Unit 2614
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/Xu Mei/
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